

**WHAT IS CLAIMED IS:**

1. A method of detecting isolated pixels in a predetermined unit area, comprising the  
5 steps of:
- comparing pixel values in at least one edge in a first direction in the predetermined unit area to a first predetermined threshold value to generate a first comparison result;
  - determining an average pixel value for a group of pixels in a second direction in the predetermined unit area, the second direction being perpendicular to the first direction, the  
10 group of pixels including outer lines and inner lines;
  - selecting a larger one of the average pixel values from the outer lines, the selected outer average pixel value being defined as  $Th$ ;
  - selecting a largest one of the average pixel values from the inner lines, the selected inner average pixel value being defined as  $Max$ ;
  - 15 comparing  $(Mx - Th)$  to a predetermined second threshold value to generate a second comparison result; and
  - detecting an isolated portion in the predetermined unit area based upon the first comparison result and the second comparison result.
- 20 2. The method of detecting isolated pixels in a predetermined unit area according to claim 1 wherein said comparing pixel values in the one edge in the first direction further comprising additional steps of:
- counting a number of the pixel values that is lower than the first predetermined threshold; and
  - 25 comparing the number of the pixel values to a predetermined pixel number threshold to generate the first comparison result.
3. The method of detecting isolated pixels in a predetermined unit area according to claim 1 wherein the pixel values are compared in a first pair of parallel edges in the first direction

in the predetermined unit area to the first predetermined threshold value to generate the first comparison result.

4. The method of detecting isolated pixels in a predetermined unit area according to claim

5 3 further comprising additional steps of:

comparing pixel values in a second pair of parallel edges in a second direction in the predetermined unit area to the first predetermined threshold value to generate a third comparison result; and

10 detecting an isolated portion in the predetermined unit area based upon the first comparison result, the second comparison result and the third comparison result.

5. The method of detecting isolated pixels in a predetermined unit area according to claim

1 further comprising additional steps of:

15 determining an average pixel value for a group of pixels in the first direction in the predetermined unit area, the group of pixels including outer lines and inner lines;

selecting a larger one of the average pixel values from the outer lines, the selected outer average pixel value being defined as  $Th$ ;

selecting a largest one of the average pixel values from the inner lines, the selected inner average pixel value being defined as  $Max$ ;

20 comparing  $(Mx - Th)$  to a predetermined second threshold value to generate a third comparison result; and

detecting an isolated portion in the predetermined unit area based upon the first comparison result, the second comparison result and the third comparison result to generate an isolated pixel detection result.

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6. The method of detecting isolated pixels in a predetermined unit area according to claim

1 wherein the predetermined unit area is a rectangular area.

7. The method of detecting isolated pixels in a predetermined unit area according to claim

30 6 wherein the rectangular area is a five by seven pixel area.

8. The method of detecting isolated pixels in a predetermined unit area according to claim 1 further comprising an additional step of removing the isolated portion in the predetermined unit area based upon the isolated pixel detection result.
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9. The method of detecting isolated pixels in a predetermined unit area according to claim 8 wherein the isolated portion includes a current pixel and surrounding pixels.
10. The method of detecting isolated pixels in a predetermined unit area according to claim 9 wherein a pixel value in the isolated portion is replaced with a predetermined value.
- 10
11. The method of detecting isolated pixels in a predetermined unit area according to claim 10 wherein the predetermined value is zero.
12. The method of detecting isolated pixels in a predetermined unit area according to claim 10 wherein the predetermined value is a background pixel color value.
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13. The method of detecting isolated pixels in a predetermined unit area according to claim 1 further comprising an additional step of digitizing an original image.
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14. The method of detecting isolated pixels in a predetermined unit area according to claim 13 wherein said digitizing is performed by a scanner.
15. The method of detecting isolated pixels in a predetermined unit area according to claim 6 wherein said removing is performed by a printer.
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16. The method of detecting isolated pixels in a predetermined unit area according to claim 8 wherein said removing is performed by a facsimile machine.
17. A system for detecting isolated pixels in a predetermined unit area, comprising:
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an input unit for inputting pixel values of the predetermined unit area;

a pixel value averaging unit for determining an average pixel value for a group of pixels in a second direction in the predetermined unit area, the second direction being perpendicular to the first direction, the group of pixels including outer lines and inner lines,  
5 said comparing unit selecting a larger one of the average pixel values from the outer lines;

a comparing unit connected to said input unit for comparing the pixel values in at least one edge in a first direction in the predetermined unit area to a first predetermined threshold value to generate a first comparison result; the selected outer average pixel value being defined as  $Th$  and selecting a largest one of the average pixel values from the inner  
10 lines, the selected inner average pixel value being defined as  $Max$ , said comparing unit comparing  $(Mx - Th)$  to a predetermined second threshold value to generate a second comparison result; and

an isolated portion detecting unit connected to said comparing unit for detecting an isolated portion in the predetermined unit area based upon the first comparison result and  
15 the second comparison result.

18. The system for detecting isolated pixels in a predetermined unit area according to claim 17 wherein said comparing unit counts a number of the pixel values that is lower than the first predetermined threshold and compares the number of the pixel values to a  
20 predetermined pixel number threshold to generate the first comparison result.

19. The system for detecting isolated pixels in a predetermined unit area according to claim 17 wherein said comparing unit compares the pixel values in a first pair of parallel edges in the first direction in the predetermined unit area to the first predetermined threshold value  
25 to generate the first comparison result.

20. The system for detecting isolated pixels in a predetermined unit area according to claim 19 wherein said comparing unit further comparing pixel values in a second pair of parallel edges in a second direction in the predetermined unit area to the first predetermined  
30 threshold value to generate a third comparison result, wherein said isolated portion

detection unit detects an isolated portion in the predetermined unit area based upon the first comparison result, the second comparison result and the third comparison result.

21. The system for detecting isolated pixels in a predetermined unit area according to claim  
5 17 wherein said pixel value averaging unit further determines an average pixel value for a  
group of pixels in the first direction in the predetermined unit area, the group of pixels  
including outer lines and inner lines, said comparing unit selecting a larger one of the  
average pixel values from the outer lines, the selected outer average pixel value being  
defined as  $Th$ , said comparing unit selecting a largest one of the average pixel values from  
10 the inner lines, the selected inner average pixel value being defined as  $Max$ , said selecting  
unit comparing ( $Mx - Th$ ) to a predetermined second threshold value to generate a third  
comparison result, wherein said isolated portion detection unit detects an isolated portion  
in the predetermined unit area based upon the first comparison result, the second  
comparison result and the third comparison result to generate an isolated pixel detection  
15 result.

22. The system for detecting isolated pixels in a predetermined unit area according to claim  
17 wherein the predetermined unit area is a rectangular area.

20 23. The system for detecting isolated pixels in a predetermined unit area according to claim  
22 wherein the rectangular area is a five by seven pixel area.

24. The system for detecting isolated pixels in a predetermined unit area according to claim  
17 further comprising an isolated portion removing unit connected to said isolated portion  
25 detection unit for removing the isolated portion in the predetermined unit area based upon  
the isolated pixel detection result.

25. The system for detecting isolated pixels in a predetermined unit area according to claim  
24 wherein the isolated portion includes a current pixel and surrounding pixels.

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26. The system for detecting isolated pixels in a predetermined unit area according to claim 25 wherein a pixel value in the isolated portion is replaced with a predetermined value.
27. The system for detecting isolated pixels in a predetermined unit area according to claim 5 26 wherein the predetermined value is zero.
28. The system for detecting isolated pixels in a predetermined unit area according to claim 26 wherein the predetermined value is a background pixel color value.
- 10 29. The system for detecting isolated pixels in a predetermined unit area according to claim 17 further comprising a scanner connected to said input unit for digitizing an original image.
30. The system for detecting isolated pixels in a predetermined unit area according to claim 15 24 wherein said isolated portion removing unit includes a printer.
31. The system for detecting isolated pixels in a predetermined unit area according to claim 24 wherein said isolated portion removing unit includes a facsimile machine.
- 20 32. A software storage medium for storing a computer readable program containing computer instructions for detecting isolated pixels in a predetermined unit area, the computer instructions performing the tasks of:
- 25       comparing pixel values in a first pair of parallel edges in a first direction in the predetermined unit area to a first predetermined threshold value to generate a first comparison result;
- determining an average pixel value for a group of pixels in a second direction in the predetermined unit area, the second direction being perpendicular to the first direction, the group of pixels including outer lines and inner lines;
- selecting a larger one of the average pixel values from the outer lines, the selected 30 outer average pixel value being defined as  $Th$ ;

selecting a largest one of the average pixel values from the inner lines, the selected inner average pixel value being defined as Max;

comparing ( $Mx - Th$ ) to a predetermined second threshold value to generate a second comparison result; and

5 detecting an isolated portion in the predetermined unit area based upon the first comparison result and the second comparison result.

33. A method of detecting isolated pixels in a predetermined unit area, comprising the steps of:

10 comparing pixel values in a first pair of parallel edges in a first direction in the predetermined unit area to a first predetermined threshold value to generate a first comparison result;

comparing pixel values in a second pair of parallel edges in a second direction in the predetermined unit area to the first predetermined threshold value to generate a third  
15 comparison result;

determining an average pixel value for a group of pixels in a second direction in the predetermined unit area, the second direction being perpendicular to the first direction, the group of pixels including outer lines and inner lines;

selecting a larger one of the average pixel values from the outer lines, the selected  
20 outer average pixel value being defined as Th;

selecting a largest one of the average pixel values from the inner lines, the selected inner average pixel value being defined as Max;

comparing ( $Mx - Th$ ) to a predetermined second threshold value to generate a second comparison result; and

25 detecting an isolated portion in the predetermined unit area based upon the first comparison result, the second comparison result and the third comparison result.

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